

WHAT IS CLAIMED IS:

1. An integrated switch with band translation, comprising:
 - a first input configured to receive a first signal in a first input frequency band, the first input frequency band selected from a plurality of predetermined frequency bands;
 - a second input configured to receive a second signal in a second input frequency band, the second input frequency band selected from the plurality of predetermined frequency bands;
 - a crosspoint switch connected to the first input and second input, the crosspoint switch configured to selectively route the first signal to a first switch output selected from a plurality of switch outputs and further configured to route the second signal to a second switch output selected from the plurality of switch outputs;
 - a first band translation device connected to the first switch output, the first band translation device configured to frequency translate the first signal to a first output frequency band selected from the plurality of predetermined frequency bands; and
 - a second band translation device connected to the second switch output, the second band translation device configured to frequency translate the second signal to a second output frequency band selected from the plurality of predetermined frequency bands.
2. The integrated switch with band translation of Claim 1, further comprising a first amplifier interposed between the first input and a first input of the crosspoint switch, the amplifier comprising an input connected to the first input and an output connected to the first input of the crosspoint switch, the amplifier output also connected to a cascade output.
3. The integrated switch with band translation of Claim 1, further comprising:
 - a first filter having an input and an output, the input of the first filter connected to an output of the first band translation device, and
 - a second filter having an input and an output, the input of the second filter connected to an output of the second band translation device.

4. The integrated switch with band translation of Claim 3, wherein the first filter comprises a bandpass filter having a passband comprising the first output frequency band.

5. The integrated switch with band translation of Claim 1, further comprising a signal summer having a first input connected to an output of the first band translation device, the signal summer having a second input connected to an output of the second band translation device.

6. The integrated switch with band translation of Claim 1, wherein the plurality of predetermined frequency bands comprises the first input frequency band and the second input frequency band.

7. The integrated switch with band translation of Claim 1, wherein the first input is further configured to receive a third signal in a third input frequency band selected from the plurality of predetermined frequency bands, and wherein the second input is further configured to receive a fourth signal in a fourth input frequency band selected from the plurality of predetermined frequency bands.

8. The integrated switch with band translation of Claim 7, wherein the second input frequency band comprises substantially the third input frequency band.

9. The integrated switch with band translation of Claim 7, wherein the first input frequency band comprises substantially the fourth input frequency band.

10. The integrated switch with band translation of Claim 1, wherein the first input frequency band comprises substantially the first output frequency band.

11. The integrated switch with band translation of Claim 1, wherein the first input frequency band comprises a frequency band distinct from the first output frequency band.

12. The integrated switch with band translation of Claim 1, further comprising a block converter having an output connected to the first input, the block converter configured to receive signals from a satellite transponder group and block convert the signals from the satellite transponder group to the first input frequency band.

13. A band translation switch, comprising:

a plurality of amplifiers, each amplifier having an amplifier input and an amplifier output, each amplifier configured to receive an input signal having at least two frequency bands selected from a plurality of predetermined frequency bands;

a crosspoint switch comprising N inputs and M outputs, the crosspoint switch configured to selectively connect any of the N inputs to any of the M outputs, each of the N inputs connected to at least one amplifier output; and

M band translation devices, each of the M band translation devices having an input connected to one of the M outputs of the crosspoint switch, each of the M band translation devices configured to frequency translate a signal from the one of the M outputs of the crosspoint switch from a first frequency band to a second frequency band.

14. The band translation switch of Claim 13, wherein each of the plurality of amplifiers comprises a low noise amplifier having an output of the band translation switch in parallel with the amplifier output.

15. The band translation switch of Claim 13, wherein each of the plurality of amplifiers comprises:

a first buffer amplifier having an input connected to the amplifier input and an output connected to the amplifier output; and

a second buffer amplifier having an input connected to the amplifier input, the output of the buffer amplifier comprising an output of the band translation switch.

16. The band translation switch of Claim 13, wherein each of the plurality of amplifiers comprises:

a power divider having an input connected to the amplifier input, a first divider output, and a second divider output, wherein the second divider output comprises an output of the band translation switch; and

a buffer amplifier having an input connected to the first divider output, the buffer amplifier also having an output connected to the amplifier output.

17. The band translation switch of Claim 13, wherein a first amplifier selected from the plurality of amplifiers is configured to receive a band-stacked signal having a signal in a lower frequency band and a signal in an upper frequency band, the lower frequency band and the upper frequency band selected from the plurality of predetermined frequency bands.

18. The band translation switch of Claim 17, wherein a first band translation device is configured to frequency translate the signal in the lower frequency band signal to an output signal in the upper frequency band.

19. The band translation switch of Claim 17, wherein a first band translation device is configured to frequency translate the signal in the upper frequency band signal to an output signal in the lower frequency band.

20. The band translation switch of Claim 13, wherein each of the M band translation devices comprises:

a frequency translation signal path; and

a pass-through signal path in parallel with the frequency translation path;

wherein each of the M band translation devices is independently controlled to select either the frequency translation signal path or the pass-through signal path.

21. The band translation switch of Claim 13, further comprising a Local Oscillator (LO) and wherein each of the M band translation devices comprises a mixer having a LO port connected to the LO.

22. The band translation switch of Claim 21, wherein the LO is a programmable frequency LO.

23. The band translation switch of Claim 21, wherein the LO is a fixed frequency LO.

24. The band translation switch of Claim 13, wherein the first frequency band and the second frequency band are selected from the plurality of predetermined frequency bands.

25. A band translation switch comprising:

a first input amplifier on a substrate, the first amplifier having an input and an output, the first amplifier configured to receive a first signal in a first frequency band selected from a plurality of predetermined frequency bands;

a second input amplifier on the substrate, the second amplifier having an input and an output, the second amplifier configured to receive a second signal in a second frequency band selected from the plurality of predetermined frequency bands;

a switch on the substrate, the switch having first and second inputs connected to the first amplifier output and the second amplifier output, respectively, the switch

also having a first switch output and a second switch output, the switch configured to selectively route a signal from the first switch input to one of the first switch output or the second switch output;

a first band translation device on the substrate, the first band translation device having an input connected to the first switch output, the first band translation device configured to selectively frequency translate the first signal from the first frequency band to the second frequency band; and

a second band translation device on the substrate, the second band translation device connected to the second switch output, the second band translation device configured to selectively frequency translate the second signal from the second frequency band to the first frequency band.

26. The band translation switch of Claim 25, wherein the substrate comprises a material selected from the group comprising silicon, silicon-germanium, germanium, sapphire, and diamond.

27. The band translation switch of Claim 25, further comprising:

a first block converter configured to receive input signals from a first satellite transponder, the first block converter further configured to frequency translate the input signals to the first signal in the first frequency band.

28. A method of integrated band translation, the method comprising:

receiving an input signal from a satellite transponder group, the input signal in a first frequency band selected from a plurality of predetermined frequency bands;

amplifying the input signals in an amplifier;

coupling a cascade output to an amplifier output;

routing a signal from the amplifier output, independent of the cascade output, to a first band translation device selected from a plurality of band translation devices;

frequency translating the signal from the amplifier output from the first frequency band to a second frequency band, the second frequency band selected from the plurality of predetermined frequency bands.

29. The method of Claim 28, wherein the act of receiving the input signal comprises:

- receiving first downlink signals from the satellite transponder group; and
block converting the downlink signals to the first frequency band.
30. The method of Claim 29, wherein the act of receiving the input signal further comprises:
- receiving second downlink signals from an additional satellite transponder group; and
block converting the second downlink signals to the second frequency band.
31. A method of integrated band translation, the method comprising:
- receiving one or more input signals;
routing, using a crosspoint switch, each of the one or more input signals to any combination of one or more band translation devices; and
frequency translating at least one of the input signals using the one or more band translation devices.
32. The method of Claim 31, wherein receiving one or more input signals comprises receiving input signals from a first frequency band.
33. The method of Claim 31, wherein receiving one or more input signals comprises receiving input signals from a satellite transponder.
34. The method of Claim 31, wherein receiving one or more input signals comprises receiving input signals having a known polarization.
35. The method of Claim 31, wherein receiving one or more input signals comprises:
- receiving a first input signal in a first input frequency band at a first input; and
receiving a second input signal in a second input frequency band at a second input.
36. The method of Claim 35, wherein the first input frequency band is independent of the second input frequency band.
37. The method of Claim 35, wherein the first input frequency band overlaps at least partially the second input frequency band.
38. The method of Claim 31, further comprising passing at least one input signal to an output of a band translation device without frequency translation.

39. The method of Claim 31, wherein frequency translating at least one of the input signals comprises:

frequency translating, in a first band translation device, a first input signal in a first frequency band to a first output signal in a first output frequency band; and

frequency translating, in a second band translation device, a second input signal in a second frequency band to a second output signal in a second output frequency band .

40. The method of Claim 39, further comprising combining the first output signal with the second output signal.

41. The method of Claim 31, wherein frequency translating at least one of the input signals comprises frequency downconverting the at least one input signal.

42. The method of Claim 31, wherein frequency translating at least one of the input signals comprises frequency upconverting the at least one input signal.

43. The method of Claim 31, wherein frequency translating at least one of the input signals comprises:

frequency upconverting the at least one input signal frequency at least one time; and

frequency downconverting the at least one input signal at least one time.

44. The method of Claim 31, wherein frequency translating at least one of the input signals comprises:

frequency downconverting the at least one input signal to at least one baseband signal; and

frequency upconverting the at least one baseband signal to an output frequency band.

45. The method of Claim 31, wherein frequency translating at least one of the input signals comprises:

mixing the at least one input signal with a first Local Oscillator (LO) frequency in a first mixer; and

mixing the at least one input signal with a second LO frequency in a second mixer.

46. The method of Claim 45, wherein the first LO comprises a frequency tunable LO.
47. The method of Claim 45, wherein the first LO comprises the second LO.
48. The method of Claim 31, further comprising outputting at least one of the one or more input signals prior to frequency translation.
49. The method of Claim 31, further comprising amplifying the one or more input signals.
50. A band translation device, the device comprising:
 - one or more inputs each configured to receive one or more input signals;
 - a crosspoint switch coupled to the one or more inputs and configured to route each of the one or more input signals to any combination of one or more crosspoint switch outputs; and
 - one or more band translation devices having inputs coupled to at least one of the one or more crosspoint switch outputs, at least one of the one or more band translation devices configured to frequency translate the one or more input signals.